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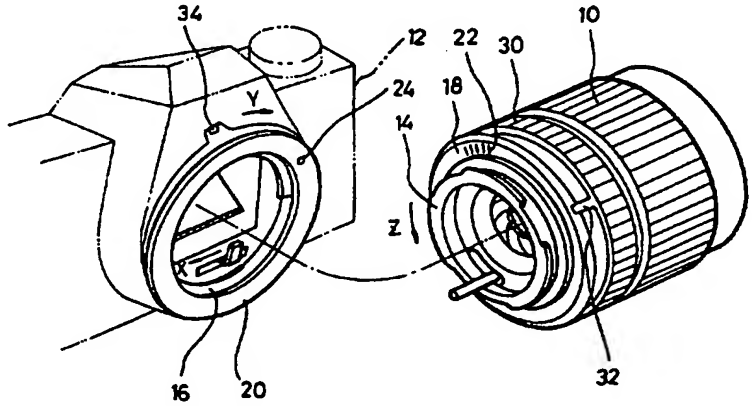
(54) Interchangeable lens camera

(57) A detector for the maximum/minimum diaphragm adjustment value of an exchangeable lens, comprises a bar code 22 on the lens, in which the maximum/minimum diaphragm adjustment value of the lens is printed in an binary code by thick line and thin line, at the part which the lens is joined with a camera; and a bar code reader 24 to output to the camera an electric pulse signal corresponding to the bar code perceived.

FIG. 2



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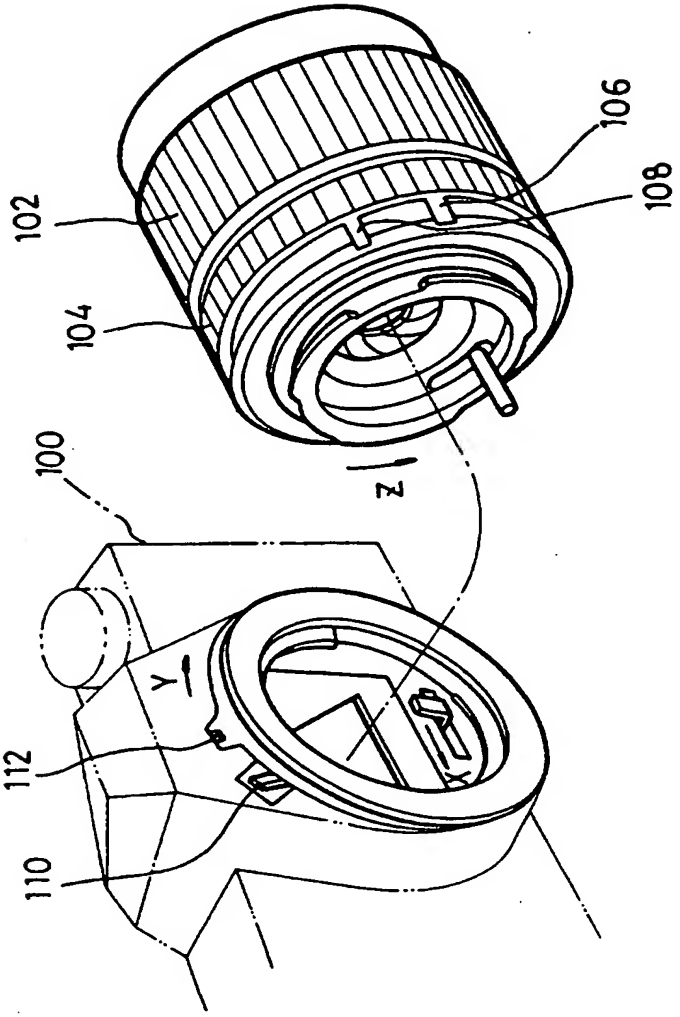

FIG. 1
(Prior Art)

FIG. 2

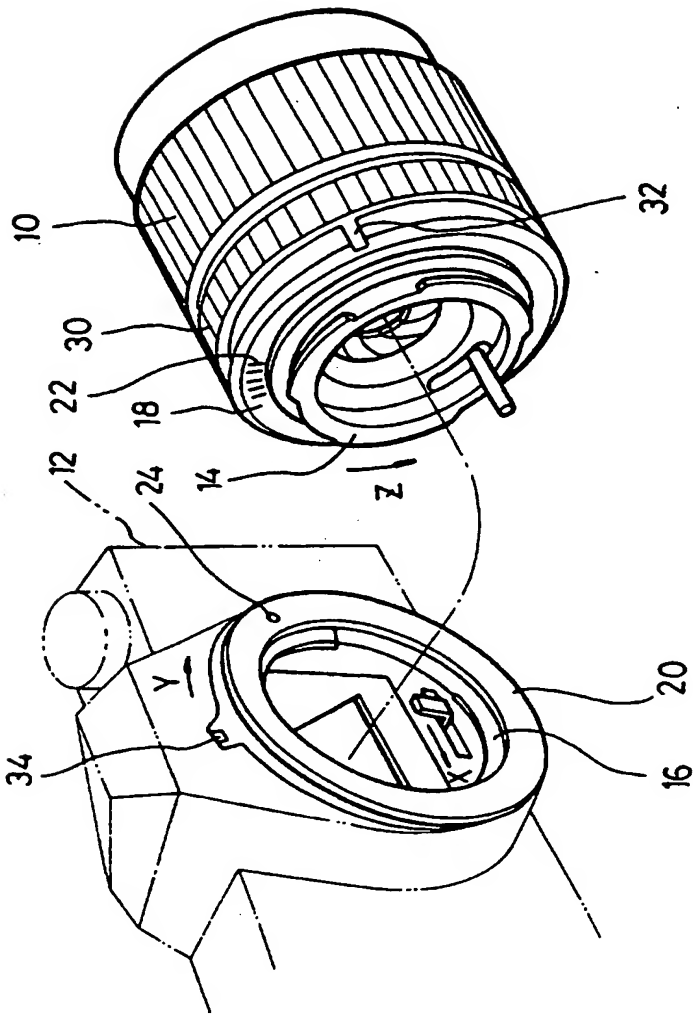

FIG. 3

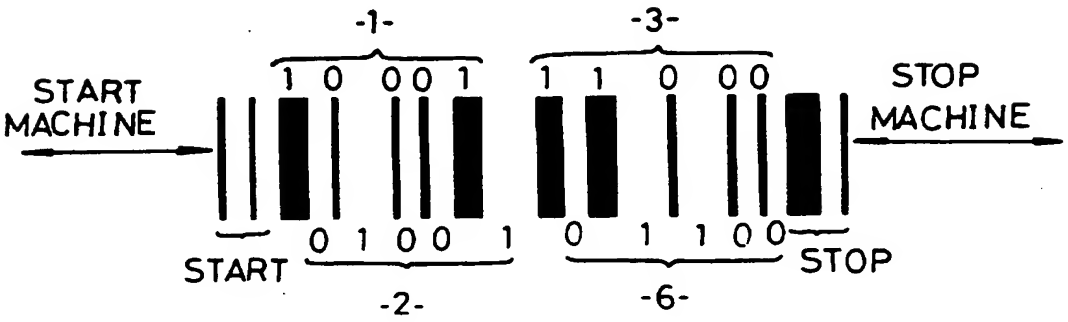

FIG. 4A

FIG. 4B

FIG. 4C

FIG. 4D

A DETECTOR USING BAR CODE FOR DETECTING THE MAXIMUM/MINIMUM DIAPHRAGM ADJUSTMENT VALUE OF AN EXCHANGE LENS

BACKGROUND OF THE INVENTION

(1) Field of Invention

The present invention relates generally to a detector using bar code for detecting the maximum/minimum diaphragm adjustment value of an exchange lens, and more particularly, to a detector using bar code for detecting the maximum/minimum diaphragm adjustment value of an exchange lens to detect a diaphragm area of a lens exactly owing to detecting the maximum/minimum diaphragm of an exchanged lens by a bar code in a camera which uses an exchange lens.

(2) Description of Related Art

Generally, performance modes according to a diaphragm area and a shutter speed in a single-lens reflex camera are a manual mode which a user can control a diaphragm adjustment value and a shutter speed, a mode of diaphragm-priority type which the control unit of a camera controls a shutter speed automatically according to an outside light after adjusting the diaphragm adjustment value to a definite value, a mode of shutter-priority type which the control unit of a camera controls a diaphragm adjustment value automatically according to an outside light after adjusting the shutter speed to a definite speed, and an automatic mode which a control unit of a camera controls a diaphragm adjustment value and a shutter speed according to a

outside light.

When selecting a mode of shutter-priority and an automatic mode among the above modes at photographing, the control unit of a camera should perceive the maximum/minimum diaphragm adjustment value of an attached lens so that the diaphragm adjustment value might be controlled properly in the limit area of the diaphragm of an exchange lens, because the maximum/minimum diaphragm adjustment value is different according to the kind of a exchanged lens.

The operating system in a conventional detector for detecting the maximum/minimum diaphragm adjustment value of an exchange lens is shown Fig. 1 as follows:

Fig. 1 is a diagram illustrating the operating system of a conventional detector for detecting the maximum/minimum diaphragm adjustment value of an exchange lens, and the composition in a camera employing an exchange lens is composed of a diaphragm control ring (2) attached to an exchange lens to control the opening and shutting quantity, projection parts (21, 22) formed by being united with the above diaphragm control ring, and a maximum diaphragm adjustment value perception shaft (11) formed at the joint of an exchange lens, joined to the above projection parts (21, 22) and interlocked according to a movement amount of the above diaphragm control ring (2).

When an exchange lens is joined to a camera, a projection part (22) united with a diagram control ring is in contact with the left of a diaphragm adjustment value perception shaft (9) of a camera.

Accordingly, if a user rotate a diaphragm control ring (2) in the direction of Z, a diaphragm adjustment value perception shaft (9) is interlocked and rotated in the direction of Y. At this time, a diaphragm adjustment value perception shaft is interlocked within the sphere between the maximum diaphragm adjustment value and the minimum diaphragm adjustment value of a lens.

The above diaphragm adjustment value perception part (9) connected with a inside rheostat unillustrated by wire inputs the electronic signal corresponding into a variable resistance value changed according to position shift of a diaphragm adjustment value perception shift into the control unit of a camera and, also, the value corresponding to the pattern position changed according to position shift of the above diaphragm adjustment value perception part (9) connected with a fixed pattern into the control unit.

Accordingly, if the position of a diaphragm control ring (2) is fixed, the position of a diaphragm adjustment value perception part (9) is set by being interlocked with it. At this time, a diaphragm adjustment value may be perceived as a consequence of the corresponding signal value input into the control unit of a camera.

When an exchange lens is joined to camera at the stage which a diaphragm adjustment value control ring (2) is located in the maximum diaphragm adjustment value, a projection part (21) united with a diagram control ring is in contact with the maximum diaphragm adjustment value perception shaft (11) and rotated in the direction of Y.

When a diaphragm adjustment value control ring (2) is joined to camera at the stage out of the maximum diaphragm adjustment value, the maximum diaphragm adjustment value perception shift (11) is rotated in the direction of Y by a projection part united with a diaphragm adjustment value control ring, if a user rotates a diaphragm control ring (2) toward the maximum diaphragm adjustment value after joining lens with a camera.

The above maximum diaphragm adjustment value perception shift (11) and the projection part (21) are not joined at the range except the maximum diaphragm adjustment value, are joined only at the maximum diaphragm adjustment value and perceive the maximum diaphragm adjustment value.

The above diaphragm adjustment value perception shaft (11) connected with a variable rheostat or a fixed pattern in the same manner with the above diaphragm adjustment value perception part (9) inputs an electric signal corresponding to the position fixed according to a direction movement into the control unit of a camera.

The minimum diaphragm adjustment value may be interpreted the diaphragm control range of an exchange lens joined at present by reading the minimum diaphragm adjustment value corresponding with the maximum diaphragm adjustment value.

However, there is a defect that a conventional detector for detecting the maximum/minimum diaphragm adjustment value of an exchange lens may generate loss, e.g. drawing and components work, because it attaches many components between camera and lens according to implemental combination in order to perceive the maximum/minimum diaphragm adjustment value.

Also, though the same maximum diaphragm adjustment value for each kind of an exchange lens is many in general, there is every probability to make an error in movement to read the minimum diaphragm adjustment value of a lens according to the perceived maximum diaphragm adjustment value, because there are many cases that the minimum diaphragm adjustment values are chosen differently according to each kind of an exchange lens.

SUMMARY OF THE INVENTION

Therefore, an object of the present invention is to provide a detector using bar code for detecting the maximum/minimum diaphragm adjustment value of an exchange lens to detect exactly an diaphragm area of an exchanged lens by using a bar code reader joined to the joint of a camera, after printing the maximum/minimum diaphragm of a lens corresponding to an exchanged lens by another bar code, in a camera which uses an exchange lens.

To achieve the above purpose, the present invention is composed of a bar code, in which the maximum/minimum diaphragm adjustment value of an exchange lens is printed in a binary code by thick line and thin line, at the part which the above exchange lens is joined with a camera; a bar code reader to output an electric pulse signal corresponding to a perceived bar code owing to radiating a fixed scanning line to the above bar code, at the part which the above exchange lens is joined with a camera.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view illustrating a conventional detector for detecting the maximum/minimum diaphragm adjustment value of an exchange lens;

Fig. 2 is a perspective view illustrating a detector using bar code for detecting the maximum/minimum diaphragm adjustment value of an exchange lens according to a preferred embodiment of the present invention;

Fig. 3 is a diagram illustrating a composition of a bar code for a detector using bar code for detecting the maximum/minimum diaphragm adjustment value of an exchange lens according to a preferred embodiment of the present invention; and

Figs. 4A to 4D are state views illustrating general kinds of bar codes according to a preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Reference will now be made in detail to a preferred embodiment of the invention, an example of which is illustrated in the accompanying drawings. Wherever possible, the same reference characters will be used throughout the drawings to refer to the same or like parts.

Fig. 2 is a perspective view illustrating a detector using bar code for detecting the maximum/minimum diaphragm adjustment value of an exchange lens according to a preferred embodiment of the present invention. Fig. 3 is a diagram illustrating a composition of a bar code for a detector using bar code for detecting the maximum/minimum diaphragm adjustment value of an exchange lens according to a preferred embodiment of the present invention. Figs. 4A to 4 are state views illustrating general kinds of bar codes according to a preferred embodiment of the present invention.

As illustrated in Fig. 2, the composition of a detector using bar code for detecting the maximum/minimum diaphragm adjustment value of an exchange lens according to a preferred embodiment of the present invention is follows:

A bar code 16 attached at a base 3 which is a joint part to join an exchange lens with a camera, and a bar code reader 11 to output an electric pulse signal corresponding to a perceived number by radiating a scanning line to read a bar code 16 attached at the above exchange lens.

The above bar code reader 11 is composed of photoelectric elements and attached at a mount 14 which is a joint part to join an exchange lens with a camera.

The operation of a detector using bar code for detecting the maximum/minimum diaphragm adjustment value of an exchange lens according to a preferred embodiment of the present invention is explained below:

The maximum/minimum diaphragm adjustment value of an exchange lens is perceived by using a bar code in a preferred embodiment of the present invention.

Generally, a bar code denotes a number or a word expressed in an binary code by thick line and thin line, and, after corresponding each logical value 1, 0 to a thick or a thin of white, black and printing them in serial signal, a bar code reader decodes a serial electric signal, which has each different pulse duration, corresponding to a thick or thin line by radiating the bar code at a uniform speed.

The above electric signal is nearly identical with Morse code, and the above serial signal is decoded into a corresponding

word or number by being compounded.

Bar code is a kind of code, which corresponds a word or a number to a binary code, and, at present, four kinds of bar codes is used in general.

The kinds of bar codes illustrated in Figs. 4A to 4D may be described according to the properties as the following table 1.

Table 1

Figs 4A-4D	code name	expression letter	message length	letter density letter/inch	minimum bar/mm	feature
(a)	code 3of9	Capital numeral $/%+-	variable	(H)9.4 (M)5.2 (L)0.53	0.19 0.3 0.53	abundant number of letter for industry
(b)	NW7	numeral -$:/.+ abcde	variable	(H)10.0 (M)5.0 (L)3.3	0.17 0.33 0.5	for library, medical institution, photo
(c)	Inter leaved 2of5	numeral	variable	(H)18.0 (M)9.3 (L)5.3	0.19 0.3 0.53	possible to rise the most density of letter
(d)	UPC EAN JAN	numeral	fixed 8 lines 13lines		1.26- 0.33- 0.66	common goods code throughout the world

It is explained below to express a number into bar code by taking ITF (Interleaved Two of Five) as an example among the kinds of bar codes described as above:

Generally, ITF method is expressed as illustrated in Fig. 3.

The bar code illustrated in Fig. 3 is a code expressed in ITF method corresponding to the number "1236". As illustrated in Fig. 3, firstly, a white margin is located at start machine, contents of information are appeared at the back of a start part expressing the beginning of bar code, and, at the end, stop part located at the last of contents of information is appeared as a shape of stop machine.

Table 2

numeral	code	letter	code
0	00110	5	10100
1	10001	6	01100
2	01001	7	00011
3	11000	8	10010
4	00101	9	01010

As recorded in the above table 2, a word is composed of five elements (5 lines) which two thick lines are among them (a word always includes 2 thick lines).

"1" among the above number "1236" is expressed to "10001" as recorded in table 2. At this time, as illustrated in Fig. 3, a thick black line expresses "1", a thin black line expresses "0", and the combination of the above two line expresses "10001. Then, the next number, "2", is expressed by a thick or a thin white line. As illustrated in fig. 3, "01001" is expressed by expressing a thick white line to "1" and a thin white line "0". The following "3" and "6" is expressed by the same method as illustrated in Fig. 3.

The maximum/minimum diaphragm adjustment value of an appropriate exchange lens is expressed equally with the above bar code expression according to a preferred embodiment of the present invention and is printed an appropriate exchange lens.

In other words, the expression of the maximum/minimum diaphragm adjustment value of an exchange lens follows the method of four number figure which is identical with ITF method as described above. For example, if the minimum diaphragm adjustment value of an appropriate exchange lens is "2.8" and the maximum diaphragm adjustment value of one is "22", it is expressed "2822" in the phase of bar code. If the minimum diaphragm adjustment value of an appropriate exchange lens is "2" and the maximum diaphragm adjustment value of one is "22", it is expressed "0222" in the phase of bar code.

A bar code 16 corresponding to the maximum/minimum diaphragm adjustment value of an exchange lens expressed as described above is printed at base 3 on the side of lens joined with a camera as illustrated in Fig. 2.

If an exchange lens, in which a bar code corresponding to the maximum/minimum diaphragm adjustment value is printed as described above, is joined with a camera, a bar code reader 11 attached to mount 14 of a camera corresponding to the part, in which a bar code is printed, reads the bar code 16 printed on a exchange lens by radiating scanning line.

Then, if a bar code reader 11 reads the value corresponding to the maximum/minimum diaphragm adjustment value of a joined exchange lens and outputs electric signal, an unillustrated control unit of a camera deciphers the maximum/minimum diaphragm

adjustment value of a joined exchange lens by compounding signals generated from the bar code reader 11.

Accordingly, the control unit of a camera adjusts the diaphragm adjustment value of an exchange lens according to the deciphered maximum/minimum diaphragm adjustment value of an exchange lens, when a shutter-priority mode or an automatic mode adjusting automatically the diaphragm adjustment value and shutter speed is chosen.

As described above, the present invention according to the preferred embodiment provides a detector using bar code for detecting the maximum/minimum diaphragm adjustment value of an exchange lens, which, after printing the maximum/minimum diaphragm adjustment value of a lens corresponding to an exchange lens to a bar code, can detect exactly the diaphragm area of a joined lens by using a bar code reader attached to the lens cohesion part of a camera in a camera employing an exchange lens, and has an effect which may compose the simple connection part because an additional part to detect a diaphragm adjustment value is not attached to a part in which a lens is joined with a camera.

CLAIMS

1. A detector using bar code for detecting the maximum/minimum diaphragm adjustment value of an exchange lens, in a camera using an exchange lens, comprising:

a bar code, in which the maximum/minimum diaphragm adjustment value of an exchange lens is printed in a binary code by thick lines and thin lines, at the part which the above exchange lens is joined with a camera; and

a bar code reader to output an electric pulse signal corresponding to a bar code perceived by radiating a fixed scanning line to the above bar code at the part in which the above exchange lens is joined with a camera.

2. A detector using bar code for detecting the maximum/minimum diaphragm adjustment value of an exchange lens of claim 1, wherein the above bar code is expressed and printed in ITF method.

3. A bar code of claim 2, wherein a number corresponding to the minimum diaphragm adjustment value is expressed in the first two figures and a number corresponding to the maximum diaphragm adjustment value is expressed in the next two figures.

4. A detector using bar code for detecting the maximum/minimum diaphragm adjustment value of an exchange lens of claim 1, wherein the above bar code is formed at the top portion of mount part in which an exchange lens is joined with a camera.

5. A detector using bar code for detecting the maximum/minimum diaphragm adjustment value of an exchange lens of claim 1, wherein the above bar code reader is composed of

photoelectric elements.

6. A detector using bar code for detecting the maximum/minimum diaphragm adjustment value of an exchange lens, substantially as herein described with reference to Figs. 2 to 4A-4D of the accompanying drawings.

The Patent Office

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Application No: GB 9606322.7 **Examiner:** R.A.Short
Claims searched: 1-6 **Date of search:** 4 June 1996

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): G2A (ACGA,ACGX,ACAX,ADX); G2J (J23A,J23B,J23C,J23X).

Int Cl (Ed.6): G03B.

Other: Online:WPI

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
A	GB 2,232,262 A	(Asahi) Information read from CPU	-
A	GB 2,087,578 A	(Olympus) Information read from magnet	-
A	US 5,122,822 A	(Morisawa) see claim 4.	-

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.